

REMARKS

The invention relates in part to the discovery of a catalyst comprising a refractory metal oxide, a layer comprising platinum and a layer comprising vanadia, which catalyst selectively oxidizes ammonia to nitrogen with minimal formation of NO_x.

Claim 9 has been canceled. Claim 1 has been amended to recite the limitation previously recited in claim 9. Claims 3 and 4 have been amended to correct their claim dependency. Withdrawn claims 10 and 20 have also been amended to preserve the possibility of rejoinder upon allowance of claim 1. The amendments introduce no new matter.

Upon entry of this Amendment, claims 1-7 and 10-22 are pending. Claims 10-22 stand withdrawn as drawn to a non-elected invention.

Information Disclosure Statement

Applicants thank the Examiner for considering the references cited on the Information Disclosure Statements submitted September 10, 2003 and February 11, 2005 and for initialing and returning the corresponding Form 1449's.

Rejection under 35 U.S.C. §103

Claims 1-9 are rejected under 35 U.S.C. §103 as being obvious over Deeba et al. (USP 6,764,665) in view of Yaluris et al (USP 6,660,683).

Claims 8 and 9 have been canceled. Therefore, the rejection of these claims is rendered moot.

The invention as claimed is drawn to a layered ammonia oxidation catalyst comprising a refractory metal oxide, a layer of platinum disposed upon the refractory metal oxide and a layer of vanadia disposed upon the platinum, wherein said vanadia is present in the amount of about 13 to about 104 g/ft³. The invention as claimed is not rendered obvious by the combination of Deeba and Yaluris.

Deeba discloses a three-way catalyst (TWC) having three layers (col. 4, lines 59-61). TWCs are used in the treatment of exhaust gas streams from internal combustion engines (col. 1, lines 17-20). A TWC catalyzes the oxidation by oxygen of unburned hydrocarbons and carbon monoxide, as well as the reduction of nitrogen

oxides (NO_x) to nitrogen (Deeba, col. 1, lines 26-29). The first layer of TWC taught by Deeba is a high surface area refractory metal oxide. The second layer comprises palladium and/or platinum. The third layer comprises palladium and/or platinum and an oxygen storage component. Deeba teaches that the oxygen storage component for the TWC is a reducible oxide of a rare earth metal (col. 6, lines 52-56). Deeba does not teach or suggest that the oxygen storage component can be any known oxygen storage component, or that it can be vanadia. Deeba further teaches that the oxygen storage component is present in the third layer in an amount of about 0.5 to about 1.25 g/in³ (col. 6, lines 50-52). This amount corresponds to about 864 to about 2160 g/ft³. Deeba does not teach or suggest reducing the amount of oxygen storage component to any amount less than 864 g/ft³ at all, let alone to about 13 to about 104 g/ft³.

Yaluris is drawn to a composition for use in a fuel catalytic cracking unit (FCCU) regenerator, in addition to an FCC catalyst (col. 3, line 65-col. 4, line 5). The composition is designed to reduce gas phase reduced nitrogen species, such as ammonia (NH_3) and hydrogen cyanide (HCN), produced in an FCCU operated in a partial or incomplete combustion mode (e.g. little to no oxygen; col. 1, lines 9-14). The composition of Yaluris comprises an acidic metal oxide; an alkali metal, alkaline earth metal or mixtures thereof; an oxygen storage component; and a noble metal component (col. 6, lines 16-23). The oxygen storage component is present from at least 0.1 wt.% and most preferably from 5 to 30 wt% of the total composition. Vanadium is disclosed as one of many possible oxygen storage components useful in the composition (col. 7, lines 14-33). Yaluris does not teach or suggest that the disclosed FCCU composition functions as a TWC in the conditions of an internal combustion engine.

The deficiencies of the Deeba teachings are not overcome by the teachings in Yaluris because the ordinarily skilled artisan would not be motivated to modify the teachings of Deeba with those of Yaluris. Deeba discloses a TWC. In contrast, Yaluris discloses a composition for use in treating the gas stream coming off an FCCU regenerator. The gas stream treated using a TWC is not the same as the gas stream in an FCCU regenerator. Furthermore, the temperature profiles of these two processes is quite different. A TWC functions at elevated gas temperatures found in internal combustion engines (~1000° C; Deeba col. 1, lines 60-61). The reaction

temperature in the FCC regenerator is lower (600° C to 800° C; Yaluris col. 11, lines 50-52)). As such, the catalytic needs are different. Thus, the ordinarily skilled artisan would not be motivated to combine teachings regarding a TWC with teachings about a composition useful in an FCCU regenerator.

Furthermore, one of ordinary skill in the art would not be motivated to reduce the amount of oxygen storage component in the Deeba TWC composition, because such a modification would render Deeba's invention unsatisfactory for its intended purpose. As mentioned above, a TWC catalyzes the oxidation by oxygen of unburned hydrocarbons and carbon monoxide, as well as the reduction of nitrogen oxides (NO_x) to nitrogen. High simultaneous conversion rates of all three pollutants depends on the ratio of air to fuel (A:F ratio). The catalyst window of a TWC is the stoichiometric range of air to fuel in which TWC function satisfactorily to achieve high conversion rates of all three pollutants. The ordinarily skilled artisan knows that the catalyst window of a TWC is expanded by the presence of an oxygen storage component in a TWC. Expanding the catalyst window thus improves the removal of all three pollutants from the gas streams by extending the range of operation of the TWC. The ordinarily skilled artisan would not be inclined to reduce the amount of the oxygen storage component in Deeba, as such a reduction would reduce the catalyst window, and impair the performance of the TWC. Thus, there is no suggestion or motivation for the ordinarily skilled artisan to reduce the amount of the oxygen storage component in Deeba's TWC.

The claimed invention is not rendered obvious by Deeba or Yaluris, individually or in combination. Applicants respectfully request reconsideration and withdrawal of the rejections under 35 U.S.C. §103.

Summary

Applicants respectfully submit that the rejection by the Examiner to the claims of the present application has been overcome, and that claims 1-7 are in condition for allowance. Reconsideration and allowance of these claims is respectfully requested at the earliest possible date. Applicants further request the rejoinder of claims 10-22 with claims 1-7 and the examination of claims 10-22.

Respectfully submitted,
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